Electric Control Valves with Jet Pump

Type 3267/5857, Type 3267/5824, Type 3267/5825,
Type 3267/5757, Type 3267/5724, Type 3267/5725

Pneumatic Control Valves with Jet Pump

Type 3267/2780

Valve with Jet Pump in version with screwed ends

Fig. 1 · Type 3267/5824

Mounting and Operating Instructions

EB 5895 EN

Edition April 2010

Definitions of the signal words used in these instructions

⚠ ***DANGER!***
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING!
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

NOTICE
NOTICE indicates a property damage message.

Note: *Supplementary explanations, information and tips*

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1 Important safety instructions

For your own safety, follow these instructions concerning the mounting, start up and operation of the control valve:

- The control valves with jet pump must be installed, started up and serviced by fully trained and qualified personnel only, observing the accepted industry codes and practices.
  Make sure employees or third persons are not exposed to any danger.
  All safety instructions and warnings in these mounting and operating instructions, particularly those concerning installation, start-up and maintenance, must be observed.
- For appropriate operation, make sure that the control valve is only used in applications where the operating pressure and temperatures do not exceed the operating values based on the sizing data submitted in the order.
  Note that the manufacturer does not assume any responsibility for damage caused by external forces or any other external factors.
  Any hazards which could be caused in the control valve by the process medium or operating pressure are to be prevented by means of appropriate measures.
- For installation and maintenance, make sure the relevant section of the pipeline is depressurized and, depending on the process medium, drained as well. If necessary, allow the control valve to cool down or warm up to reach ambient temperature prior to starting any work on it.
- The actuators are designed for use in low voltage installations.
  For wiring and maintenance, you are required to observe the relevant safety regulations.
- Take necessary measures to ensure that the power supply cannot be reconnected inadvertently.
- Take care while performing adjustment work on live parts. Never remove any covers!

To avoid damage to any equipment, the following also applies:

- Proper shipping and appropriate storage are assumed.

Note: *The control valves fulfill the requirements of the European Pressure Equipment Directive 97/23/EC. Valves with a CE marking have a declaration of conformity which includes information about the applied conformity assessment procedure.*
The declaration of conformity is available on request.

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2 Design and principle of operation

Control valves with jet pumps are used in control circuits, especially in district heating supply plants. They assume both the function of a valve for temperature control and that of a circulator pump for the heating water circuit. Configured as mixing valves, they replace the reducing valve and circulator pump usually installed.

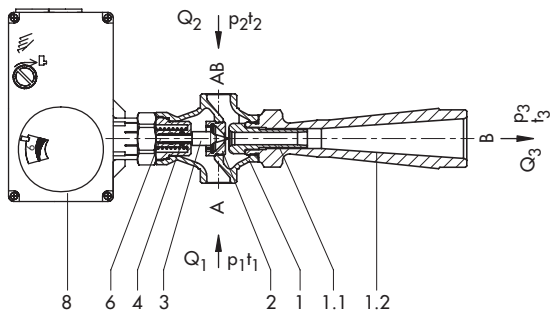
The control valves with jet pumps consist of a valve body (1) with jet nozzle (2) and plug (3), mixing nozzle (1.1) and diffuser (1.2). The variable cross-sectional area between the valve plug and jet nozzle determines the jet stream Q_1.

The jet stream Q_1 is accelerated in the jet nozzle and flows to the mixing nozzle at high speed. The exiting jet draws the partial flow Q_2 with it. In the mixing nozzle, the two flows are mixed together. During the mixing process, the jet stream releases a portion of its kinetic energy to the intake flow. This exchange of energy causes an increase in pressure and, at the same time, a decrease in jet stream velocity. In the downstream diffuser, the velocity is further reduced, and the pressure increases to the output value p_3.

The turbulence in both the mixing chamber and the mixing nozzle does not only cause the exchange of energy described, but also causes an exceptionally thorough mixing of the supplied process media. This improved mixing effect guarantees a homogenous condition of the output flow directly downstream of the diffuser.

NOTICE

The plant data used to size the jet pump must match the actual plant data to allow the jet pump to fully function.
The jet pump is sized by SAMSON AG based on the specifications made in the questionnaire for determining the operating conditions (TV-SK 8852).



1	Valve body
1.1	Mixing nozzle
1.2	Diffuser
2	Jet nozzle
3	Plug
4	Plug stem sealing
6	Plug stem
8	Actuator/controller with electric actuator

Fig. 2 · Control valve with jet pump

2.1 Versions

2.1.1 Control valve with jet pump

Electric control valves with jet pump		
Type 3267/5857	PN 25	DN 15 to 25
Type 3267/5824	PN 25	DN 15 to 32
Type 3267/5825 [1]	PN 25	DN 15 to 32
Electric control valves with jet pump/controllers with electric actuators for DHW heating		
Type 3267/5757	PN 25	DN 15 to 25
Type 3267/5724	PN 25	DN 15 to 32
Type 3267/5725 [1]	PN 25	DN 15 to 32
Electric control valves with jet pump/controllers with electric actuators for heating and cooling applications		
Type 3267/5757-7	PN 25	DN 15 to 25
Type 3267/5725-7 [1]	PN 25	DN 15 to 32
Pneumatic control valves with jet pump		
Type 3267/2780-1	PN 25	DN 15 to 32
Type 3267/2780-2 [2]	PN 25	DN 15 to 32

[1] With fail-safe action tested acc. to DIN EN 14597, register number available on request

[2] Pneumatic actuator suitable for integrated positioner attachment

2.1.2 Type 3267 Valve in version with screwed ends

Nominal size, Kvs coefficients, body materials

DN	Characteristic 2: K_{vs}	Travel	PN/material
15	0.32 · 0.5	6 mm	PN 25/CC491K PN 25/CC499K
20	0.8 · 1.25		
25	1.0 · 1.6		
32	2.0 · 3.2		

2.2 Possible combinations: Type 3267 in version with screwed ends/actuator

	Type	Refer to EB for details	Nominal size DN			
			15	20	25	32
Electric actuators	5857	EB 5857 EN	•	•	•	–
	5824-10	EB 5824 EN	•	•	•	•
	5824-13		•	•	•	•
	5825-10		•	•	•	•
	5825-13		•	•	•	•
Controllers with electric actuators for DHW heating	5757	EB 5757 EN	•	•	•	–
	5724-10	EB 5724 EN	•	•	•	•
	5724-13		•	•	•	•
	5725-10		•	•	•	•
	5725-13		•	•	•	•
Controller with electric actuator for heating/cooling applications	5757-7	EB 5757-7 EN	•	•	•	–
	5725-710	EB 5725-7 EN	•	•	•	•
Pneumatic actuators	2780-1	EB 5840 EN	•	•	•	•
	2780-2		•	•	•	•

2.3 Technical data: Type 3267 in version with screwed ends

Nominal size	15	20	25	32
Thread size	G ¾	G 1	G 1¼	G 1¾
Nominal pressure	PN 25			
Rated travel	6 mm			
Permissible temperatures	–10 to 150 °C [1]			
Seat/plug sealing	Metal sealing			
Type of characteristic	Linear			
Leakage rate acc. to DIN EN 1349	Class III (≤ 0.01 % of K_{VS} coefficient)			

[1] **Types 3267/5857, 3267/5757, 3267/2780:** Use an intermediate insulating piece for medium temperatures below +5 °C and above +110 °C.
Types 3267/5824, 3267/5825 and Types 3267/5724, 3267/5725: Use an intermediate insulating piece for medium temperatures below +5 °C and above +130 °C (networks with constant medium temperatures).

Materials

Nominal size	15	20	25	32
Thread size	G ¾	G 1	G 1¼	G 1¾
Body	CC491K or CC499K			
Diffuser	CC491K or CC499K			CW509L
Mixing nozzle	CW602N			
Adapter	–			CW617N
Jet nozzle	1.4305			
Plug and plug stem	1.4305			
Guide bushing	CW602N			
Stem sealing	O-ring made of EPDM			

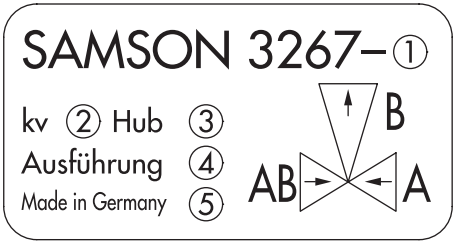
Permissible differential pressures · All pressures stated in bar (gauge)

The permissible differential pressures stated are nominal values. They are limited by the pressure-temperature diagram and the pressure ratings. In the closed position, the leakage rate indicated in the technical data is not exceeded.

Pneumatic control valves can only be used without a positioner in the 0.2 to 1.0 bar signal pressure range. For all other cases, a positioner is required.

	Electric actuators/Controllers with electric actuators						Pneumatic actuators	
Type	5857 5757 5757-7	5824-10 5724-10	5824-13 5724-13	5825-10 5725-10 5725-710	5825-13 5725-13		2780-1	2780-2
Nominal thrust	0.3 kN	0.7 kN	0.7 kN	0.5 kN	0.5 kN	Signal pressure	0.4 to 1 bar	0.4 to 2 bar
K_{VS}	Δp_H						Δp_H	
0.32	18	25	25	25	25		25	
0.5	9	23	23	16	16		15	
0.8	9	23	23	16	16		15	
1.25	4	10.5	10.5	7	7		7	
1.0	4	10.5	10.5	7	7		7	
1.6	4	10.5	10.5	7	7		7	
2.0	–	5.5	5.5	3.5	3.5		3.5	
3.2	–	5.5	5.5	3.5	3.5		3.5	

2.4 Nameplate: Ventil Type 3267 in version with screwed ends



1 Device index
2 Value as specified on order
3 Value as specified on order
4 Version
5 Year of manufacture

2.5 Customer inquiries

If you have any inquiries about the valve, please state the following details:

- Type designation with device index
- Version
- Year of manufacture
- Configuration ID (Var-ID)

3 Installation

NOTICE

The mounting position of the jet pump must be lower than the position of the consumer (radiator, air heater etc.). This ensures that the circulation is intensified at small loads by the thermal conditions. Otherwise, difficulties may arise while the plant is in operation.
If air heaters are used, we recommend mounting the jet pumps directly to them.

Keep the mixing line AB (Fig. 3) as short as possible. Do not install check valves or shut-off valves in this line.

Refer to the installation schematic drawing (Fig. 3) for the arrangement of the jet pump with the required additional instruments.

NOTICE

- *Thermometers and pressure gauges must be installed in the generator and consumer flow pipe and in the return flow pipe. A manually operated throttle valve or balancing valve (4) is absolutely necessary in the plant's return flow pipe.*
- *When using the jet pump in ventilation systems, it is absolutely necessary to include a soft-start for winter conditions!*

Rinse the pipeline thoroughly before installation.

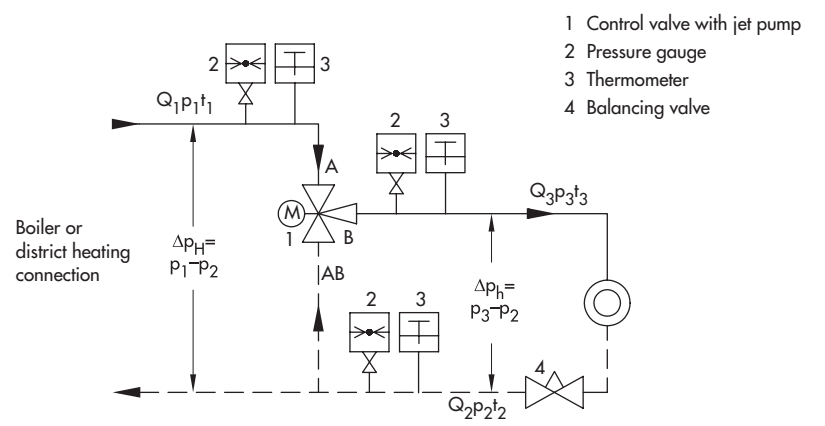


Fig. 3 · Required pressure and temperature measuring instruments

3.1 Mounting position

The Type 3267 Valve with Jet Pump must be installed with the diffuser in the horizontal position.

NOTICE

- *The flow direction of ports A, B and AB must match those specified in the plant schematics (Fig. 3).*
- *When selecting the point of location, make sure that the valve is still easily accessible after the plant construction has been completed.*
- *Make sure the valve is mounted free of stress. If necessary, support the piping near the connections. Never attach the supports to the jet pump or to the actuator.*

3.2 Strainer

Install a strainer (e.g. SAMSON Type 2 NI) at the valve inlet to prevent any sealing parts, weld spatter or other foreign matter carried along by the process medium from impairing the proper functioning of the valve, in particular, the tight shut-off.

NOTICE

- *Install the strainer with the flow direction as indicated by the arrow on the body.*
- *Install the strainer with the filter element facing downwards.*
- *Make sure that enough space is left to remove the filter.*

3.3 Additional mounting instructions

We recommend to install a hand-operated shut-off valve upstream of the strainer and downstream of the control valve to be able to shut down the plant for cleaning and maintenance, and when the plant is not used for longer periods of time.

4 Mounting, connecting and configuring the actuator

NOTICE

The instructions to mount the valve onto the actuator, to perform electrical or pneumatic connections as well as to configure the actuator are described in detail in the Mounting and Operating Instructions (EB) of the actuator:

- *Refer to EB 5857 EN for Type 5857 Electric Actuator*
- *Refer to EB 5824 EN for Type 5824 Electric Actuator*
- *Refer to EB 5824 EN for Type 5825 Electric Actuator*
- *Refer to EB 5757 EN for Type 5757 Controller with Electric Actuator*
- *Refer to EB 5724 EN for Type 5724 Controller with Electric Actuator*
- *Refer to EB 5724 EN for Type 5725 Controller with Electric Actuator*
- *Refer to EB 5757-7 EN for Type 5757-7 Controller with Electric Actuator*
- *Refer to EB 5725-7 EN for Type 5725-7 Controller with Electric Actuator*
- *Refer to EB 5840 EN for Type 2780 Pneumatic Actuator*

It is essential to read the Mounting and Operating Instructions of the corresponding actuator.

4.1 Mounting

Mount the actuator onto the valve connection/intermediate insulating piece as described in the corresponding Mounting and Operating Instructions.

4.2 Connection

Perform the electrical or pneumatic connections of the actuator as described in the corresponding Mounting and Operating Instructions.

4.3 Configuration

The electric actuator versions with positioner and the controllers with electric actuator can be adapted to the control task.

Configure the actuator as described in the corresponding Mounting and Operating Instructions.

5 Jet pump adjustment

Sizing

The plant data used to size the jet pump must match the actual plant data to allow the jet pump to fully function.

The jet pump is sized by SAMSON AG based on the specifications made in the questionnaire for determining the operating conditions (TV-SK 8852).

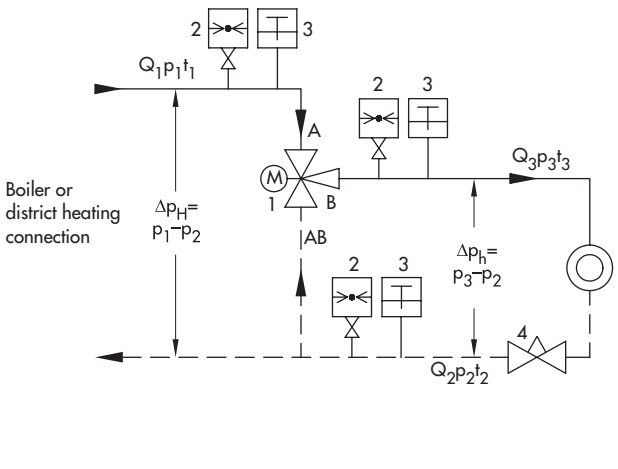
Adjustment

NOTICE

To adjust the jet pump, the pressure and temperature measuring instruments illustrated in Fig. 4 are absolutely necessary.

The **required temperature t_3** in the consumer plant results from the ratio of the flows Q_1, Q_2 and Q_3 as well as the differential pressures Δp_H and Δp_h across the plant.

If the temperature t_3 in the consumer plant (at full rated travel H_{100}) is not achieved with the network pressure Δp_H available, the differential pressure Δp_h across the balancing valve (4) must be adjusted. To do this, proceed as follows:



1 Control valve with jet pump
2 Pressure gauge
3 Thermometer
4 Balancing valve

Q_1 Flow rate in network flow
Q_2 Flow rate in network return flow
Q_3 Flow rate in output flow
p_1 Pressure in network flow
p_2 Pressure in network return flow
p_3 Pressure in output flow
t_1 Temperature in network flow
t_2 Temperature in network return flow
t_3 Temperature in output flow

Fig. 4 · Jet pump adjustment

1. Determine the flow rate ratio m_{100} from the temperatures t_1, t_2 and t_3 (read off at the thermometers) using the following equation:

$$m_{100} = \frac{Q_1}{Q_3} = \frac{t_3 - t_2}{t_1 - t_2}$$

2. Determine the pressure ratio ε_{100} from the pressures p_1, p_2 und p_3 (read off at the pressure gauges) using the following equation:

$$\varepsilon_{100} = \frac{\Delta p_h}{\Delta p_H} = \frac{p_3 - p_2}{p_1 - p_2}$$

3. Enter the flow rate ratio m_{100} and pressure ratio ε_{100} on the operating diagram (Fig. 5). The point of intersection (operating point) must be within the gray-shaded operational area. If not, the jet pump has been incorrectly sized.

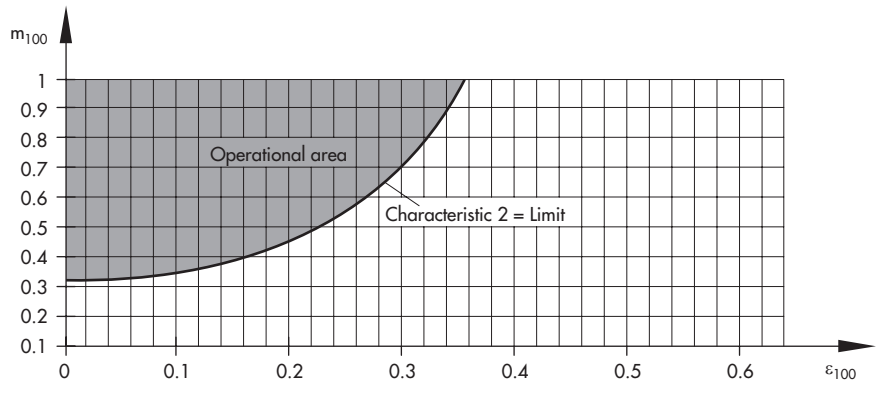
4. For optimal operation, the operating point lies on the marked limit (Characteristic 2).

   Shift the determined point of intersection horizontally (same flow rate ratio m_{100}) until it reaches the limit and read off the corresponding pressure ratio ε_{100}.

5. Using the value read from the diagram for ε_{100} and the known network pressure Δp_H, the plant differential pressure Δp_h can be calculated:

$$\Delta p_h = \Delta p_H \cdot \varepsilon_{100}$$

6. Adjust the balancing valve until the calculated differential pressure Δp_h is achieved or until the correct temperature ratio is achieved.



The flow ratio m_{100} and the pressure ratio ε_{100} are based on the full rated travel H_{100}.

Fig. 5 · Operating diagram: Type 3267 Valve with Jet Pump in version with screwed ends

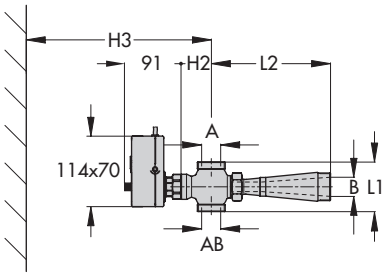
6 Dimensions and weights

Control valves with jet pump

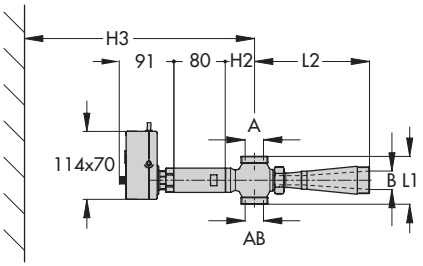
Nominal size A, B, AB	DN	15	20	25	32
Thread size A, B, AB		G 3/4	G 1	G 1 1/4	G 1 3/4
Overall length L1	mm	65	70	75	100
Length L2	mm	100	140	180	230
Height H2	mm	45	45	45	95
Height H3	mm	175	175	175	230
Weight without actuator	Approx. kg	0.8	1.2	2.0	6.0

Actuators/controllers with electric actuator

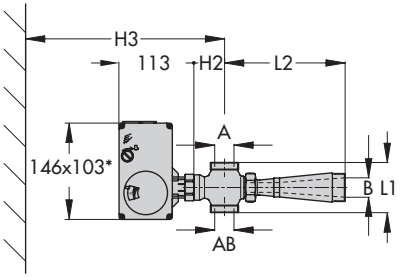
Actuators/ controllers with electric actuator	Type	5857 5757	5824 5724	5825 5725	2780
Effective area	cm^2	–			120
Loading pressure connection					G 1/8
Weight	Approx. kg	–	–	1.5	2
With handwheel	Approx. kg	0.7	1.3	–	–



Type 3267/5857: DN 15 to 25
Type 3267/5757: DN 15 to 25

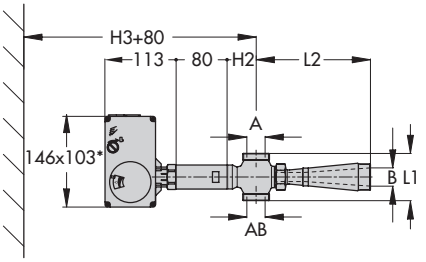


Version with intermediate insulating piece for temperatures below +5 °C and above +130 °C

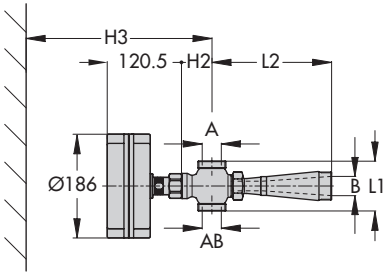


Type 3267/5824: DN 15 to 32
Type 3267/5825: DN 15 to 32
Type 3267/5724: DN 15 to 32
Type 3267/5725: DN 15 to 32

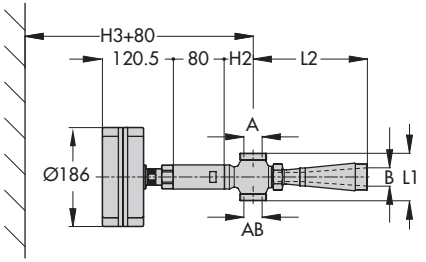
* Dimensions for Types 5824-13, 5825-13, 5724-13 and 5725-13: 146 x 136



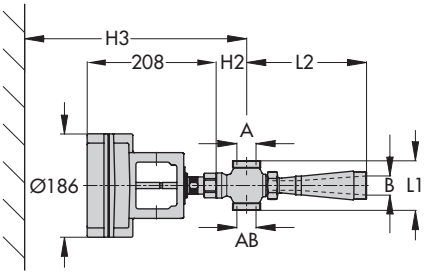
Version with intermediate insulating piece for temperatures below +5 °C and above +130 °C



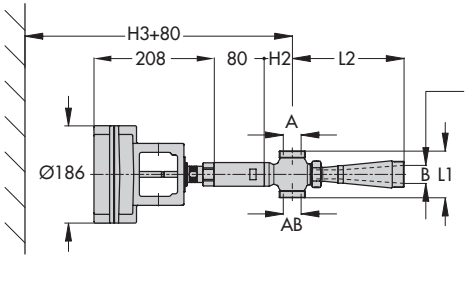
Type 3267/2780-1: DN 15 to 32



Version with intermediate insulating piece for temperatures up to 150 °C



Type 3267/2780-2: DN 15 to 32



Version with intermediate insulating piece for temperatures up to 150 °C

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